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Original Article

Cognitive modeling in the system of higher education

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Abstract:
The main purpose of the study is to find ways to introduce procedural and situational approaches in the process of formation and implementation of state policy in the field of higher education of physical culture in Eastern Europe. The methodological basis is the scenario method, the basic structural elements and signs of which are monitoring the sequence of events of determining the cause-effect relationships of the stages of transformation; transformation of the process under study; the hypothetical nature of the description. The main standards of the selected methods were the observance of ethical and professional rules for conducting the assessment. The data obtained allow to build alternative pictures of the future, which makes it possible to overcome the continuous variability and the infinite number of available opportunities for the development strategy of the educational system. Research has limitations. The technique of cognitive modelling was carried out exclusively on public policy and education system. In the future, the methods of the presented cognitive modelling, in particular the scenario method, can be adapted to other industries. The results of cognitive modeling were based on assessing the specifics of the basic concepts that affect the prognostic trends in the development of higher education of physical culture in Eastern Europe and can be used to improve their state policy in this area. The originality of the study lies in the modelling a cognitive map of the development the sphere of education, and a detailed analysis of the system of impact indicators was created at the heart on this map.
Key Words: public policy, algorithm, cognitive map, concepts, scenario method

Introduction

The complexity and multidimensionality of the functioning of socio-economic poorly structured systems complicates the process of their forecasting. Open weakly structured systems are characterized by a large number of elements, relationships and interactions between them, the complexity of the structure formed by these elements (multilayer, hierarchical, etc.), increasing the complexity of the system through weak interactions between these elements; certain dynamics of the system, the complexity of its behaviour, unpredictability; inherent patterns of interaction of parts and the whole (integrity, interactivity) patterns of hierarchical ordering of systems (communicative, hierarchical) and the functioning and development of systems (historicity, self-organization). An effective method of research and prediction of their development is modelling, which allows to display an object (system, problem situation) with different classes of models, thus organizing the gradual processes of cognition and formalization of the task. Cognitive modelling of systems is aimed at developing formal models and methods that support the intelligent process of solving problems by taking into account the cognitive capabilities (perception, presentation, cognition, understanding, explanation) of management subjects in solving management problems in these models and methods.

The key concept in cognitive modeling is a "cognitive map", which is a weighted directed graph, in which the vertices are one-to-one with the factors, in terms of which the subject area is described, and the arcs represent direct connections (mutual influences) between the factors. Interactions can be positive (an increase / decrease in one factor leads to an increase / decrease in another) and negative (an increase / decrease in one factor leads to a decrease / increase in another). To display the degree of influence, a set of linguistic variables and the corresponding set of numerical values from the interval [0, 1] are used: "very weak" - 0.1, "moderate" - 0.3, "significant" - 0.5, "strong" - 0.7 and "very strong" - 0.9 (intermediate values are also acceptable).
To compile a cognitive model of the subject area, you must:
-highlight a list of significant factors;
-build a matrix of interactions;
-determine the initial trends in factors.

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The strategic goal of state policy in the field of higher education of physical culture in Eastern Europe is to increase the availability of quality education in accordance with the requirements of innovative economic development and the modern needs of society, competitiveness in the global world. The education system must be modernized in accordance with the needs of society. According to this logic, in the process of modernization of the education system, it is necessary to rethink the direction of state policy in the field of higher education of physical culture, to clarify its goals, objectives and mechanisms for their implementation.

The main purpose of the study is to find ways to introduce procedural and situational approaches in the process of formation and implementation of state policy in the field of higher education of physical culture in Eastern Europe. The main object of research is the system of higher education of physical culture in Eastern Europe and the possibility of developing public policy in this area.

The originality of the study lies in the modelling a cognitive map of the development the sphere of education, and a detailed analysis of the system of impact indicators was created at the heart on this map.

Material & methods

The role of higher education of physical culture in modern conditions can hardly be overestimated, because by investing in education, modern society ensures the dynamism of progressive changes in the economy and in other areas of public life. The objective basis of such changes is the intellectualization of labor, organically integrated into the economic system, focused on the continuity of training and advanced training of workers. So, higher education of physical culture is becoming an important factor in social stability and effective employment. Promoting economic growth due to the impact on labor productivity, university education provides an increase in national income, poverty reduction, an increase in the level of production and consumption culture, and an improvement in the quality of life.

Korsak (2019) considers the "national educational policy" as a set of priorities and goals that are formed by the government or other supreme body for the implementation of measures to improve and develop the education system or its elements. Guberskaya (2019) defined state policy in the field of higher education of physical culture as an integral component of the general educational policy of the state, the meaning of which lies in the formation and legal consolidation of the general strategy of higher education of physical culture, the definition of goals, objectives and relevant areas of action aimed at ensuring the functioning and development of the higher education of physical culture system.

To date, the topic of cognitive modeling both in education and in general scientific circles is becoming particularly relevant. This is due to the fact that this method is the latest, most comprehensive and opens up new approaches to the study of this subject.

A significant number of works have been devoted to the study of the methodology of cognitive modeling in public administration and the education system, including authors such as Stepurina (2011), Polterovich, (2018), Monterrat, B., Yessad, A., Bouchet, F., Lavoué, E ., Luengo, (2017) and others

For example, Derbentseva, Grabarev, (2017) in their scientific works studied the types and methods of constructing cognitive maps, their principles and structuring. In its turn Kulinich, (2017) studied system modelling issues whose consequences and results are difficult to predict or those that are non-standard for a particular system.

The next step in the study of cognitive modeling is the definition and study of the adaptive capabilities of each individual method for a specific industry. In this area, the most significant research should be considered the scientific works of Filippova (2014), which in its work brought out the most relevant adaptation methods of cognitive modeling.

Cognitive models can build assumptions about how multiple aspects or variables interact, and produce behaviors observed in empirical research. In real situations, multiple influences produce behavior. Cognitive models help to understand what interrelated cognitive processes lead to the observed behavioral outcome (Wolf and Brechmann, 2015).

The use of cognitive modeling in the field of control is found in separate works of leading scientists of the world. For example, Prezenski, Brechmann, Wolf nad Russwinkel (2017) used this type of modeling to make dynamic management decisions. Separately, it should be noted that there are a number of scientists who devote their research exclusively to characterizing the very essence of the features of the cognitive modeling process (Farrell and Lewandowsky, 2015). Holt and Osman (2017) in their study use the main approaches to cognitive modeling in the field of control of dynamic systems.

We can recall and conducted research on the features of cognitive modeling in the field of assessing the education system (Pham and Chen, 2014).

When it comes of the study of the scenario method, which today is an advanced type of cognitive modeling in the field of education, the technological aspects of the implementation of cognitive modeling in the field of scenario development were studied by Ph. Van Notten (2006).

Cognitive analysis is one of the most powerful tools for studying poorly structured environments, contributing to an understanding of existing problems, identifying contradictions and a qualitative analysis of the processes taking place in these environments. The scope of cognitive modeling is wide enough - business,

regional management, the development of economic and political strategies and programs, sociological research, the military sphere, information security and conflict resolution.

Cognitive modeling contributes to a better understanding of the problem situation, the identification of contradictions and a qualitative analysis of the system. The goal of cognitive modeling is to formulate and refine the hypothesis about the functioning of the object under study is considered as complex system that consists of individual elements and subsystems interconnected (Maksimov, Kornoushenko, Kachaev, 2019). The cognitive map reflects the influence of factors on each other. It does not display the detailed nature of these influences, the dynamics of changes in the effects depending on changes in the situation and temporary changes in factors. Taking these circumstances into account requires a transition to the next level of information structuring, that is, to a cognitive model (Osipov, 2019). The main purpose of the cognitive model is to help an expert generate the right managerial decision.

Among the tools for implementing evidence-based policy in practice, we include cognitive modeling, through the use of qualitative characteristics and the ability to take into account the relationships of a significant number of factors, it allows a qualitative description of various processes and a single scheme to describe the qualitative and quantitative relationships between elements of the education system, which influence the formation process public policy in the research area (Kulinich, 2020). The simplest and most explicit goal of developing a cognitive model in the process of forming public policy in the field of education system is to obtain a more complete and accurate understanding of the various aspects of the functioning of the higher education of physical culture in Eastern Europe. The solution of research problems is closely connected with this modeling function, that is, the identification of some new patterns as a result of the formalization of individual parameters of phenomena and processes.

In the general case, a cognitive map is a causal network.

$G = <C, W>,$ (1)

where G is a directed graph (cognitive map)

C - is the set of vertices (factors, concepts),

Ci is $Ci = 1,2, ..., n,$ (2)

being elements of the system under study;

W - is the set of connections between concepts (edges of the graph), which are interpreted as causal (causal) connections. As a rule, many C factors (concepts) are divided into three subsets: many input factors, or control parameters

$U = \{u1, u2, ..., um\}$ (3)

many intermediate factors

$E = \{e1, e2, ..., ep\}$ (4)

and the set of output (target) factors $Y = \{y1, y2, ..., yl\}.$ (5)

Each vertex Ci is associated with a vector of independent variables

$Xi = X (Ci) = \{Xg (Ci)\}, g = 1,2,., Li$ (6)

the essential parameters characterizing it.

According to the methods of expertly specifying the degree of strength of cause-effect relationships and the meanings of concepts, one can distinguish the following types of cognitive maps: qualitative (iconic) weighted ones; fuzzy. It is known that the basis of existing approaches is the expert method of constructing a cognitive model - a cognitive map of the situation containing a combination of factors and the relationships between them. A distinctive feature of the methodology is the formation of a cognitive map of the object of research based on the use of a calculation-expert approach to determining its parameters: expert method - to form factors of the model; calculation method - to assess the strength of the relationship between the factors of the model using statistical data on the value of factors in a certain time interval.

Methodology

One of the tools for solving applied linguistic problems is knowledge modeling, that is, cognitive modeling. A world model is a combination of organized knowledge about the world that characterizes a cognitive system or computer model that reproduces it. The model of the world is that part of the cognitive system that retains knowledge about the structure of the world and the laws of its construction. The model of the world is a mental model of understanding the text, which shows how the knowledge about the world of the author of the text and the plan of the content of the text are related (Barsalon, 2012). Cognitive / mental models that show socially and culturally important stereotypical situations, which in turn reflect stereotypical scenarios, are called frames. Among other cognitive models that reflect the real world in a structured, streamlined, but simplified form, Baranov calls "scripts, scenes, scripts, plans, matrices, profiles." A concept is a multidimensional structure, since it can be distinguished as rational and emotional, abstract and concrete, ethnic and universal. Of particular interest is the fact that the concept stands out for an individual, personalized vision of the world by each native speaker, and speech provides the best access to the description and definition of the concept. Concepts are interpreters of meaning that are constantly being refined and modified: “human knowledge must have a form that quickly adapts to these changes” (Fedulov, 2015).

A concept is culturally labeled concepts: at its core is the basic concept, and on the periphery is everything that is brought in by culture, traditions, folk and personal experience.

The essence of the method lies in the fact that a group of experts identifies the most significant factors (in our case, these are factors of influence on the development of the education system) of the observed process, and also analyses the possible relationships between them. When constructing a cognitive model, it is necessary to ensure that the number of factors considered is minimal (no more than twelve), since the excessive complexity of the model will not allow the expert to identify the most significant mechanisms and relationships. To highlight the key factors and determine the strength and nature of their relationships, the both the method of statistical factor analysis of the data obtained by the method of sociological survey and the method of expert assessments can be used. The adequacy of the model is evaluated by predicting its state at the time of obtaining statistical data on the values of the factors of the system and is ensured by introducing additional factors with the subsequent assessment of their influence on the degree of adequacy.

The model also allows to visually display stabilizing and destabilizing feedbacks that can both provide homeostasis of the system and cause significant changes. M. Maruyama (1994) proved that a contour enhances a deflection if and only if it contains an even number of negative arcs or does not contain them at all, otherwise this contour counteracts the deflection. Based on the cognitive model, decisions are made about: the impact on certain factors; communication strength changes; changes in the nature of the relationship; inclusion of new factors in the system; inclusion of new mechanisms of interaction.

The main areas of analysis of cognitive maps include: analysis of effects; analysis of the dynamics of state changes (forecast of the situation); sustainability analysis; scenario analysis; search for managerial impacts; assessment and interpretation of forecasts of the development of the situation. An analysis of the effects in the cognitive map consists in determining the sign and strength of the indirect and total influence between any pair of factors in the iconic and fuzzy cognitive maps. The study of the interaction of concepts allows to evaluate the "distribution of influence" on a cognitive map, changes its state (intermediate and output concepts). Analysis of the cognitive map allows to identify the structure of the problem (system), find the most significant factors that affect it, evaluate the effect of factors (concepts) on each other. To perform the analysis of the cognitive map, it is necessary to take into account all the indirect interaction of concepts on each other. For this, on the basis of the constructed cognitive map, matrices of the mutual influence of concepts on each other are formed, after which the behaviour and stability of the constructed map are investigated.

So, from this point of view, the cognitive model is a functional graph of the system under study, in which the vertices correspond to the factors of the system, and the arcs reflect the functional dependence between them. Substantially, basic factors (in various scientific studies the terms “concept”, “parameter” or “variable” are also used) are factors that define and limit phenomena and processes in weakly structured systems and their environment, and are interpreted by the control subject as essential, key parameters, signs of these phenomena and processes. The cognitive map (scheme) of the situation is a weighted graph oriented, it is built according to the following rules: the vertices are one-to-one correspond to the selected factors of the situation, in terms of which the processes in the system are described; the causal relationships of the identified factors with each other are identified and evaluated (positive impact, negative impact). It allows to explore the development of the situation, which includes such components as: self-development, modeling of external influences, modeling of the purposeful development of the situation (controlled development). Cognitive maps are not only a means of structuring and formalizing a situation (or system), but also a means of analyzing it. Different interpretations of vertices, edges, and weights on the edges lead to different models and methods for their analysis. We believe that the algorithm of cognitive modeling in the process of formation of state policy in the field of higher education of physical culture in Eastern Europe includes the consistent implementation of the following steps:

1. The formulation of the goals and objectives of the simulation;
2. Collection, analysis and systematization of statistical data necessary for modeling;
3. Definition of aggregated indicators;
4. Building a cognitive map;
5. Consistent decomposition of the resulting subsystems into primary statistical indicators;
6. Determining the relationships between factors;
7. Creation of a cognitive model;
8. Determination of the direction of connections (positive or negative) of the cognitive map;
9. Determination of types of relationships between factors (linear, s-shaped, etc.);
10. Determining the intensity of relationships between indicators;
11. The identification of factors that can be controlled;
12. Implementation of a computer model;
13. The choice of instrumental modeling environment;
14. Conducting a preliminary experiment;
15. Verification of the adequacy of the model;
16. The formulation of conclusions and recommendations in accordance with the goal.

Each of the steps of cognitive modeling presented in the research process was taken into account and its main stages for our study are reflected.

Results

So, let's move on to the practical aspect of the implementation of the given algorithm.

The study showed that the current socio-economic situation dictates the need for global transformations in the field of education system, the leading mission of which today is the formation of the country's intellectual potential. A balanced state policy in the field of education system fulfils its special role as a mechanism for the preparation of "development agents" who will be ready to solve the problems of development of various levels of education. The nature of the above determines the need to develop a set of models and methods that can provide support for the adoption of scientifically sound decisions in the process of forming public policy in the field of education system, in connection with which we propose the use of fuzzy cognitive modelling.

The development of cognitive models is a rather time-consuming process; therefore, various software tools are often used to automate the modelling process. As part of our study, we used a special tool - the «IGLA» decision support system, which generates and selects alternatives for managing poorly structured problem situations based on fuzzy cognitive models. Moreover, a poorly structured problematic situation is understood as a mismatch between the existing state policy in the field of education system and the desired one.

The fundamental strategy for predicting polarization in the main areas, including in connection with the progressive trend in the field of public catering in the field of local history. To do this, a sociological study was conducted on the refreshment of products such as Polish and Ukrainian. The same for summarizing the analytical work carried out in PEST analytics. For accurate display of video in the application to the program "IGLA".

Using a sociological survey and PEST-analysis, a number of basic concepts that affect the prognostic trends in the development of the higher education of physical culture in Eastern Europe was identified. As the most influential, the experts identified:

K1 - public administration mechanisms in the field of education system in Eastern Europe;
K2 - state support and social guarantees;
K3 - consistency between the market for educational services and the labour market;
K4 - the quality of education system in Eastern Europe;
K5 - destructive transformations of the system of education system;
K6 - innovative technologies;
K7 - socio-demographic factor;
K8 - imbalance of development factors in the sector of education system;
K9 - investment attractiveness;
K10 - modernization of the content of education system in Eastern Europe;
K11 - sustainable development of education system in Eastern Europe.

To establish cause-effect relationships, it is necessary to determine a scale for assessing the nature of relationships and the strength of relationships between concepts (Table 1). Structuring is as follows: each value of the connection, presented in the form of a linguistic description, is associated with one fuzzy number from the interval [-1; 1]. So, the simulated situation can be represented as a fuzzy cognitive map (Table 1), which illustrates the multiple connections and the nature of the interaction of certain concepts.

Table 1 Assessment of the nature and strength of the bonds between the vertices,presented in the form of linguistic descriptions
Source: created by authors

Linguistic description	Numerical value
Absent	0
Very weak	[0,1; 0,2]
Very weak	[– 0,1; – 0,2]
Moderately enhances	[0,21; 0,5]
Moderately weak	[– 0,21; – 0,5]
Greatly enhances	[0,51; 0,75]
Greatly weakens	[– 0,51; – 0,75]
Very strong	[0,76; 1]
Very weak	[– 0,76; –1]

The analysis of a fuzzy cognitive map showed that the degree of structural stability of the studied model is at the level of 0.5, which classifies the model as a medium rack.

The relationships presented in Figure 1 can be interpreted as transformations of percent changes in causes into percent changes in consequences. If the relationship between the concepts is positive, an increase in the value of the concept-cause leads to an increase in the value of the concept-effect, if a negative relationship is determined (the "-" sign is displayed on the map), then the value of the concept-reason increases, on the contrary, it decreases values of the concept -consequence. The analysis showed that in most cases, the elements

of the system have a positive effect on each other. This suggests that if the situation develops without any influence, the system can work stably, but this will continue until the influence of the concepts on each other begins to weaken in time in the future, which can lead to destabilization of the education system.

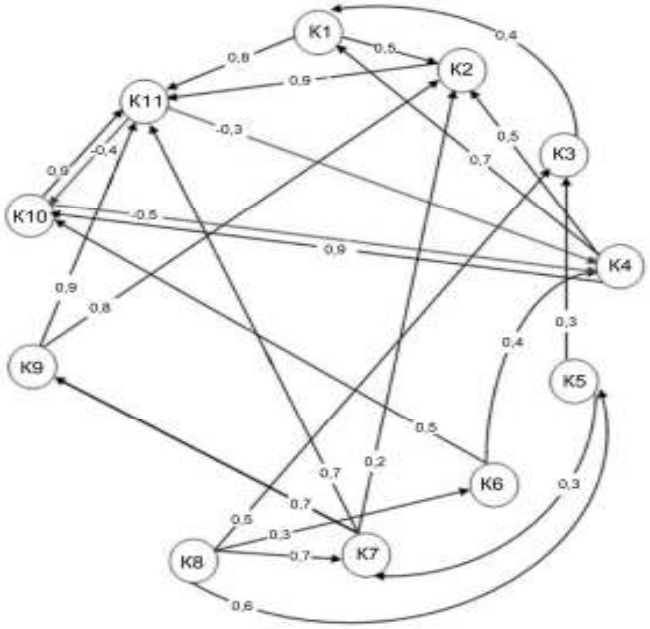

Figure 1. Fuzzy cognitive modelling map of the development of the field of education system in Eastern Europe
Source: created by authors

An assessment of the impact of concepts on the development of the education system using a fuzzy cognitive map reveals which of the concepts have the greatest impact on the entire fuzzy cognitive map and vice versa, which factors are most influenced by the fuzzy cognitive map, and also assess the degree of influence under fuzzy initial data, thereby increasing the validity of decision making (Table 2-3).

Table 2 Consonance of the influence of vertices on the system
Source: created by authors

	K1	K2	K3	K4	K5	K6	K7	K8	K9	K10	K11
K1	0,20	0,76	1,0	0,20	1,0	1,0	1,0	1,0	1,0	0,38	0,47
K2	0,20	0,20	1,0	0,20	1,0	1,0	1,0	1,0	1,0	0,38	0,47
K3	0,83	0,76	1,0	0,20	1,0	1,0	1,0	1,0	1,0	0,38	0,47
K4	0,38	0,38	1,0	0,38	1,0	1,0	1,0	1,0	1,0	0,38	0,38
K5	0,50	0,71	1,0	0,20	1,0	1,0	1,0	1,0	1,0	0,38	0,47
K6	0,23	0,23	1,0	0,23	1,0	1,0	1,0	1,0	1,0	0,38	0,38
K7	0,20	0,71	1,0	0,20	1,0	1,0	1,0	1,0	1,0	0,38	0,47
K8	0,37	0,71	1,0	0,05	1,0	1,0	1,0	1,0	1,0	0,38	0,47
K9	0,20	0,71	1,0	0,20	1,0	1,0	1,0	1,0	1,0	0,38	0,47
K10	0,38	0,38	1,0	0,38	1,0	1,0	1,0	1,0	1,0	0,38	0,38
K11	0,20	0,20	1,0	0,20	1,0	1,0	1,0	1,0	1,0	0,38	0,38

Table 3 Dissonance of the influence of vertices on the system
Source: created by authors

	K1	K2	K3	K4	K5	K6	K7	K8	K9	K10	K11
K1	-0,09	0,50	0,00	-0,14	0,00	0,00	0,00	0,00	0,00	-0,18	0,45
K2	-0,19	0,14	0,00	-0,27	0,00	0,00	0,00	0,00	0,00	-0,36	0,90
K3	0,40	0,20	0,00	-0,05	0,00	0,00	0,00	0,00	0,00	-0,07	0,18
K4	0,70	0,50	0,00	-0,45	0,00	0,00	0,00	0,00	0,00	0,90	0,81
K5	0,12	0,17	0,30	-0,06	0,00	0,00	0,30	0,00	0,21	-0,08	0,19
K6	0,28	0,20	0,00	0,40	0,00	0,00	0,00	0,00	0,00	0,50	0,45
K7	-0,13	0,56	0,19	0,00	0,00	0,00	0,00	0,00	0,70	-0,25	0,63
K8	0,20	0,39	0,50	-0,13	0,60	0,00	0,70	0,00	0,49	-0,18	0,44
K9	-0,19	0,80	0,00	-0,27	0,00	0,00	0,00	0,00	0,00	-0,33	0,90
K10	-0,35	-0,25	0,00	-0,50	0,00	0,00	0,00	0,00	0,00	-0,45	0,90
K11	-0,21	-0,15	0,00	-0,30	0,00	0,00	0,00	0,00	0,00	-0,10	0,36

The next step will be an analysis of the fuzzy cognitive map and the main conclusions obtained on the basis of the simulation (in our case, these are only system indicators of the concept's influence on the system) (Figure 2).

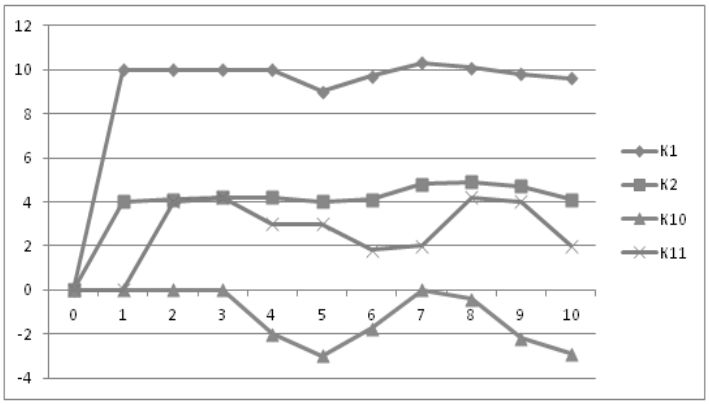

Figure 2. Concept Increase Results: Impact on the K1 concept (+ 10%)
Source: created by authors

As calculations show, with an increase in the impact on public administration mechanisms in the field of education system, there is a gradual increase in the sustainable development of the education sector (by 4%) and there should be an increase in government support and social guarantees. The need to modernize the content of education system is gradually decreasing (Figure 3).

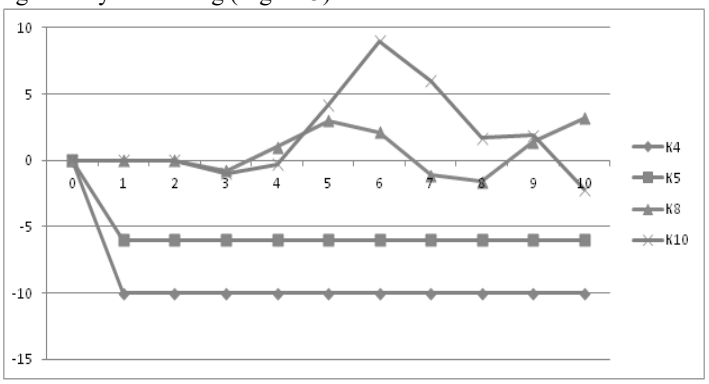

Figure 3. Concept Decrease Results: Impact on the K8 concept (- 10%)
Source: created by authors

So it can be observed that if the unbalanced factors of the development of the branch of education system are reduced by 10%, then there is a decrease in destructive transformations of the education system by 6%. Along with this, there is an increase in the process of modernization of the content of education system by 9% and the quality of education system by 3%.

The study proves that in the case of an increase in the impact on the quality of education system by 10% and the investment attractiveness of the education sector by 8%, the sustainable development of the education sector will increase significantly, while the activity of modernizing the content of education system should increase (Figure 4).

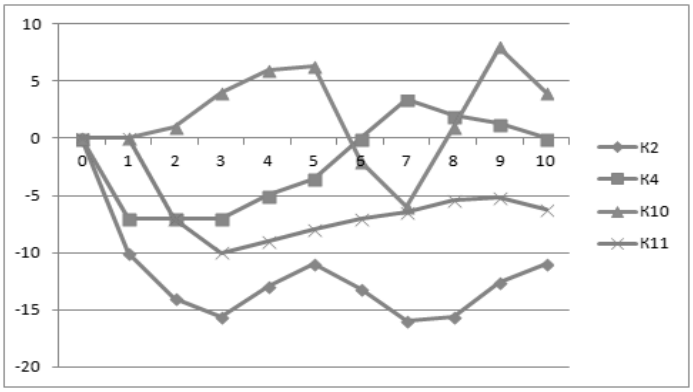

Figure 4. Concept Decrease Results: Impact on the concepts of K2 (10%) and K4 (-7%)
Source: created by authors

From the diagram (Figure 5) there was a decrease in state support and social guarantees by 10% and the quality of education system by 7% leads to a decrease in the sustainable development of the field of education system by almost 9% and an increase in the need to modernize the content of education system. However, a gradual increase in the quality of education system leads to an increase in the sustainable development of the education system.

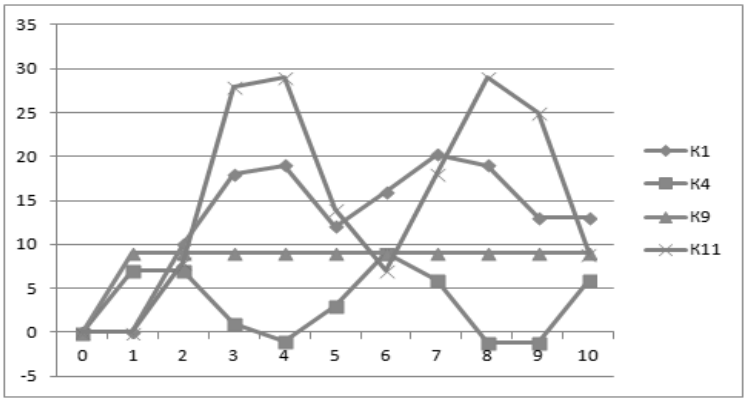

Figure 5. Concept Increase Results: Influence on concepts K1 (+ 10%), K4 (+ 10%), K9 (+ 9%)
Source: created by authors

As a result of the analysis, we see that an improvement in the mechanisms of public administration by 10% (Figure 6), an increase in the quality of education system by 7% and the investment attractiveness of the field of education system leads to rapid sustainable development of the field of education system (by 29%).

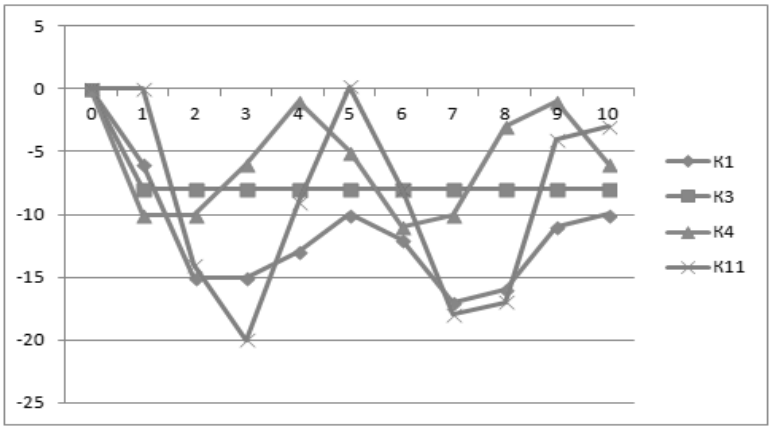

Figure 6. Concept Increase Results: Influence on concepts K1 (-6%), K3 (-8%), K4 (-10%)
Source: created by authors

A 6% reduction in the functioning of public administration mechanisms in the field of education system, a 8% coherence between the market for educational services and the labour market, and a 10% quality in education system leads to speedy inhibition of the sustainable development of education system.
A further computational experiment showed that in the following cycles, the tendencies of increase or decrease in the effects do not change, therefore we limited ourselves to explaining only those clock cycles that reflected the tendency of changes.

The results of the study indicate that the most influential development factors are: public administration mechanisms in the field of education system; quality of education system; modernization of the content of education system; sustainable development of the branch of education system. The greatest negative impact is exerted on the imbalance of the development factors of the education system.

Given the methodology of evidence-based policy, it is worth noting that, when starting to build scenarios for the implementation of state policy in the field of education system, they should take into account the results of the modelling and pay increased attention to those factors that have the greatest impact on the education system. An analysis of scientific research showed that the scenario understands “a consistent description of an alternative hypothetically possible scenario for future events, reflecting different views on the past, present and future, and can also serve as a basis for strategic planning” in the process of formation and implementation of state policy in the field of education system.

Conclusions

Using a scenario-based approach to the formation and implementation of state policy in the field of education system, it becomes possible to provide mechanisms for a flexible response to external and internal conditions that are constantly changing, as well as prioritize programs and projects for the development of education system, taking into account, on the one hand, the chosen trajectory of European integration, and on the other hand, possible changes in the recruitment, localization and timing of the implementation of new state strategies.

However, despite the need for a significant investment of time and resources to apply the scenario approach today, results can only be expected in a more or less distant future. Although, the implementation of this approach in public administration is justified and acquires exceptional importance.

The study shows that the proposed approach to modelling the process of formation of public policy in the field of education system in Eastern Europe allows to expand the range of use of evidence-based public policy in public administration. The main task that is solved within the framework of cognitive modelling is the forecasting and selection of alternative strategies for the development of the education sector for the further implementation of evidence-based state policy in the field of education system. However, attention should be paid to potential risks that may arise in the process of formation and implementation of state policy in the field of education system, which we will discuss further.

The originality of the study lies in the modelling a cognitive map of the development the sphere of education, and a detailed analysis of the system of impact indicators was created at the heart on this map.
We have identified a number of basic concepts that affect the prognostic trends in the development of the higher education of physical culture industry in Eastern Europe. As a result of the study, a cognitive map of the development of higher education of physical culture for the countries of Eastern Europe was formed. The dynamics of the impact on each of certain concepts is reflected. The proposed cognitive modeling process was used to improve public administration in higher education of physical culture in countries of Eastern Europe such as Poland and Ukraine.

Research has limitations. The technique of cognitive modelling was carried out exclusively on public policy and education system. In the future, the methods of the presented cognitive modelling, in particular the scenario method, can be adapted to other industries.

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